

STORMS AND WEATHER WARNINGS

WASHINGTON FORECAST DISTRICT

On the morning of the 3d, northwest storm warnings were ordered from Atlantic City to Boston and warning was given in radio bulletins that winds would be strong, reaching gale force at times, off the Middle and North Atlantic coast. Strong winds occurred along the coast and severe gales off the coast between Bermuda and Nantucket.

Storm warnings were ordered on the evening of the 5th from Atlantic City to Eastport in anticipation of the disturbance over Hudson Bay increasing in intensity, but winds did not reach dangerous proportions and warnings were accordingly taken down the following morning.

Warnings were hoisted on the evening of the 7th from Atlantic City to Eastport in connection with a disturbance over Ohio, and strong winds and gales occurred over the region indicated.

On the morning of the 12th, warnings of strong shifting winds were disseminated from Jacksonville to Sandy Hook and at 4 p. m. warnings of strong winds and gales were extended northward to Eastport. Warnings were ordered down south of Hatteras the night of the 12th, and warnings were continued north of Delaware Breakwater to Eastport on the 13th and 14th. Winds occurred substantially as indicated in the advices.

Warnings were ordered on the morning of the 15th from Wilmington to Boston in connection with a disturbance over the Lower Lakes and on the evening of that day were extended northward to Eastport. On the following day warnings were changed to northwest from Delaware Breakwater to Eastport, and on the 17th were continued from New London, Conn., to Eastport. Strong winds and gales occurred as forecast.

On the 21st storm warnings were hoisted from Hatteras to Eastport, but winds were only fresh to strong and did not reach gale velocities.

In connection with a disturbance over western Pennsylvania, warnings for strong, shifting winds were ordered on the 27th from Sandy Hook to Eastport and strong winds occurred substantially as indicated.

At 3 p. m. on the 30th, storm warnings were issued from Punta Gorda to Jacksonville, Fla., in connection with a disturbance of tropical origin central slightly west or northwest of the Tortugas. The disturbance moved northeastward with increased intensity across the Florida Peninsula, passing near and south of Tampa. It was attended by heavy rains, especially in the right front quadrant, a fall of 14.08 inches occurring at Miami, Fla. A discussion of the subsequent movement and warnings issued in connection with this disturbance will be found in the next issue of the MONTHLY WEATHER REVIEW.

On the 23d, norther warnings were sent to the chief hydrographer, Canal Zone, and fresh to strong north and northwest winds were indicated for the Caribbean. In his letter the chief hydrographer indicates that the wind occurred as stated in the advices.

In this connection the pilot-balloon run of November 24 at Kingston, Jamaica, is so interesting that it is given here: Surface—N—10 m p s; 250m—N—16 m p s; 500m—N—6 m p s; 750m—ESE—1 m p s; 1,000m—E—4 m p s; 1,500m—SE—2 m p s. It will be noted that the northerly current extended up to 500 meters.

Frost and freezing temperature warnings were issued for portions of the east Gulf and south Atlantic States, on the 8th, 9th, 15th, 17th, 20th, 21st, 22d, 23d, and 28th.—*R. H. Weightman.*

CHICAGO FORECAST DISTRICT

The weather in the Chicago forecast district during the month of November was rather variable, especially in the eastern portion. The mean temperature was below the average from the Mississippi Valley eastward and in most of Wyoming, and above in the balance of the district.

The total precipitation was below the normal, except in small scattered areas. The largest excesses were in the Ohio Valley and thence westward across the southern portions of Missouri and Kansas, due to the fact that the most important storms passed east-northeastward across the southern portion of the forecast district.

The principal storms affecting a considerable portion of the district were as follows:

1. Disturbance developing in the far West on the 1st–2d, the center reaching the Great Lakes by the morning of the 5th, attended almost generally by strong winds on the Lakes.

2. Disturbance which developed in the far Southwest, passing northeastward across the southern and eastern portions of the Chicago district on the 7th and 8th, attended by dangerous gales on the lower Lakes and rather strong winds on southern Lake Michigan.

3. A disturbance of apparently minor importance in the West, upon reaching the eastern portion of the district on the 12th–13th, increased decidedly in intensity. Storm winds were confined to the lower Lakes and southern Lake Huron.

4. A storm which moved from the western plateau east-northeastward over the southern portion of the forecast district and finally to the St. Lawrence Valley. The attendant gales in this case also were confined to the lower Lakes and southern Lake Huron.

5. A disturbance which appeared in Manitoba on the 20th, the center passing southeastward across Lake Superior on the 21st. The storm winds which occurred in connection with this disturbance were chiefly noted on Lake Superior and eastern Lake Michigan.

Storm warnings were ordered displayed at Lake stations at all points threatened well in advance of the appearance of these respective storms, and so far as known no casualties occurred except for the wreck of a barge in tow on Lake Superior on November 5. The towline broke, and the boat foundered, with the loss of the entire crew, consisting of six men and one woman.

No general cold-wave warnings were issued, but advices were limited to warnings on the 7th for the eastern portion of the forecast district and the 26th–27th from the Great Plains eastward across the upper Mississippi Valley and northern Lake region, decided falls in temperature following the passage of the barometric disturbances eastward across the district.

Special advices were sent to the Wenatchee Valley Traffic Association, Wenatchee, Wash., and other fruit-shipping interests in that section on each Monday morning during the month, covering the temperature conditions for the ensuing week; and it is believed that every one of these forecasts was fully verified, and that the shippers were enabled to arrange for the transfer of the crops eastward in a satisfactory manner.

From time to time special advices are furnished in connection with the protection of some project. An instance of this character is the special forecast sent to Alpena, Mich., on the morning of November 19, "Weather conditions now favorable for dredging outfit to proceed from Harbor Beach to Alpena. Moderately westerly winds and mostly fair weather indicated."

This was in response to correspondence indicating that a dredging outfit, valued at \$1,000,000, wished to proceed on Lake Huron from Harbor Beach to Alpena, moving at the rate of 6 miles an hour. November 19 was the first day following the receipt of the request when weather conditions appeared to be propitious, and the advice was accordingly sent to Alpena.—*H. J. Cox.*

NEW ORLEANS FORECAST DISTRICT

Moderate weather conditions prevailed during the month. Warnings for freezing weather were issued for the northern portion of the district on the 5th, 8th, 15th, 19th, and 27th, and warnings for frost to the coast were issued on the 8th, 15th, 16th, and 20th; freezing and frosts occurred in the areas covered by these warnings.

Cold-wave warnings were issued on the morning of the 7th for Oklahoma and Arkansas and repeated in the evening for Arkansas; subsequent conditions justified the warnings.

Small craft warnings were displayed on parts of the Texas coast on the 5th, 14th, 19th, and 22d. No general storm occurred without warning. "Norther" warning was issued for Tampico, Mexico, on the 19th, and justified by subsequent conditions.—*I. M. Cline.*

DENVER FORECAST DISTRICT

Precipitation over considerable portions of the district attended disturbances which advanced eastward from California or the southern portion of the Rocky Mountain Plateau during the 1st-4th, 12th-13th and the 23d-24th. Heavy snow in southeastern and extreme eastern Colorado on the 6th and 7th resulted from a moderate low which was central over western New Mexico and eastern Arizona on the morning of the 6th but which increased rapidly in intensity during the day.

No general cold waves occurred and no warnings were issued. Falls in temperature sufficient to amount to local cold waves were noted at Flagstaff, Ariz., on the 8th and at Durango, Colo., on the morning of the 15th.

Frost warnings which were generally verified were issued as follows: For south-central Arizona, on the 5th and 16th; south-central and southeastern Arizona, on the 6th, 7th, 8th, 9th, 11th, 12th, 13th, and 14th; southern Arizona, on the 15th, 17th, and 18th.—*J. M. Sherier.*

SAN FRANCISCO FORECAST DISTRICT

The month opened with a disturbance in the process of formation over the plateau region, another already formed and moving eastward over British Columbia and an area of high barometric pressure of considerable magnitude over the Northeast Pacific Ocean. The plateau disturbance moved slowly eastward attended by scattered rains in this forecast district until the 4th, when it passed beyond the Rocky Mountains, and the pressure rose decidedly, the weather cleared and much lower temperatures overspread practically the entire forecast district, attended by frosts by the morning of the 8th as far south as the interior of southern California. Frosts were forecast from day to day in advance of their expected occurrence.

Following the 6th the barometer became quite low over the Gulf of Alaska and it remained so until the 18th, when the widespread disturbance in that region lost intensity and disappeared. In the meantime what seemed to be secondaries of this primary cyclone, moved onto the coast north of the mouth of the

Columbia River and in every instance these were attended by sharp falls in pressure, gales and rains on the north coast. These were covered by the forecasts and warnings issued from the district forecast center. These changes, however, did not extend south of the north portion of northern California, for in southern California the weather remained fair and cool with light, local frosts in the interior.

The highest wind that occurred in connection with the disturbances on the north coast was on the 15th, when a velocity of 92 miles an hour from the south was recorded at North Head, Washington.

After the 18th, the pressure again fell, over and south of the Aleutian Islands. This disturbance advanced eastward, attended by gales over the northern part of the ocean. In fact, from this time on, the weather was stormy generally over the northeast Pacific Ocean, but relatively quiet over this forecast district, the exception being a disturbance of minor intensity which formed off the southern coast on the 23d and during the following 36 hours caused heavy local rains in southern California. During the last decade of the month a disturbance which first appeared north of the Hawaiian Islands advanced slowly eastward and at the close of the month its center was still off the California coast. It was seven days in moving from west longitude 165° to a position off the California coast, the center at all times being south of latitude 40°. This disturbance gave general rains at the close of the month throughout practically the entire forecast district. Announcements telling of the presence of this disturbance off the coast and the likelihood of its causing rains were issued from the forecast center well in advance of the occurrence of the rain.

The month was one notable for the number of disturbances over the high latitudes of the Pacific Ocean. Nearly all of these gave pressures well below 29 inches, and two of them gave pressures below 28.50 inches. Unquestionably the month was marked by heavy and frequent gales on the trans-Pacific steamer routes. Advices concerning the pressure, weather and wind conditions over the ocean were disseminated twice each day through the Navy radio stations on the Pacific coast for the benefit of shipping.—*E. H. Bowie.*

RIVERS AND FLOODS

By H. C. FRANKENFIELD

As will be noted in the table following this report, widely scattered rises—of short duration for the most part—occurred in the Middle West and South during November. They were in the main well forecast and the losses resulting unavoidable. The following table, which is necessarily incomplete, gives for the more important cases the reported losses as well as the savings resulting from Weather Bureau flood warnings:

District	Losses (chiefly unhoused crops)	Savings by warnings
Houston, Tex.....	\$55,650	\$67,500
Terre Haute, Ind.....	13,000	25,000
Vicksburg, Miss.....	15,000	(1)
Mobile, Ala.....	(1)	1,500

¹ Not reported.

In the Houston, Tex., district the value of the flood forecasts was greatly increased by the use of radio as an additional method of dissemination. The official in